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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,081	06/30/2003	Kye Nam Lee	40296-0024	7874

26633 7590 07/26/2005

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EXAMINER

VINH, LAN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 07/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/608,081

Applicant(s)

LEE ET AL.

Examiner

Lan Vinh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☐ Certified copies of the priority documents have been received.
 - 2) ☒ Certified copies of the priority documents have been received in Application No. 10/608,081.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date. _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Durlam et al (US 6,365,419)

Durlam discloses a method for fabricating an MRAM cell comprising the steps of:

forming a metal layer 42 connected to a semiconductor substrate through a lower dielectric/ insulating layer 47 (col 4, lines 20-26; fig. 7)

sequentially forming a pinned magnetic layer 44, a tunnel barrier layer 45 and free magnetic layer 46 on the metal layer 42 (col 4, lines 26-30)

forming a hard mask layer 48 on the magnetic layer 46 (col 4, lines 30-31)

the hard mask layer 48 and the free magnetic layer 46 are patterned using an etching step and MTJ cell mask 40 as seen in fig. 7, the tunnel barrier layer is exposed after the patterning step

sequentially forming a barrier layer 52 and insulating layer 50 on the entire surface (col 4, lines 35-45)

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forming an insulating spacer on the sidewall of the hard mask 48 and magnetic layer 46 by using any well known processes for the formation of sidewalls (col 4, lines 36-42; fig. 9), which reads on anisotropically etching the insulating film to form the spacer on the sidewall since it is well known in the art to anisotropically etching the insulating film to form sidewall spacers (see prior art of record for evidence of this basis) etching the tunnel layer 45, the pinned magnetic layer 44 and metal layer 42 using the insulating spacer and the hard mask layer as a mask to define/form MTJ cell and a connection layer (col 4, lines 60-67)

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2-3 rejected under 35 U.S.C. 103(a) as being unpatentable over Durlam et al (US 6,365,419) in view of Parkin et al (US 6,518,588)

Durlam's method has been described above. Unlike the instant claimed inventions as per claims 2-3, Durlam fails to disclose forming a Ta barrier layer and an insulating oxide film

Parkin discloses a method for forming a MRAM comprises the steps forming a TaN barrier layer and a insulating oxide film (col 3, lines 34-35, col 6, lines 9-10)

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Since both Durlam and Parkin are directed to method of forming MRAM one skilled in the art at the time the invention was made would have found it obvious to modify Durlam by using an insulating oxide film as per Parkin because Parkin discloses that the studs/connections of a MRAM are formed in vias in the surrounding silicon dioxide insulating material (col 3, lines 26-35). One skilled in the art at the time the invention was made would also have found it obvious to modify Durlam by forming a barrier layer of Ta in view of Parkins teaching because Parkin discloses that TaN which acts as a thermal diffusion barrier are also useful for magnetic tunnel junction device (col 6, lines 66-67)

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Sato (US 6,608,347) discloses the step of anisotropically etch an insulating film to form sidewall spacers (col 8, lines 33-36).

Response to Arguments

6. Applicant's arguments filed 6/7/2005 have been fully considered but they are not persuasive.

Applicants argue that Durlam fails to disclose or suggest the method of fabricating an MRAM cell recited in claim 1 which seeks to prevent the generation of metal polymer by-products, thus, Durlam fails to anticipate the claimed invention. This argument is unpersuasive because it does not commensurate with the scope of claim 1 since claim

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1 does not require/recite a method of fabricating an MRAM which seeks to prevent the generation of metal polymer by-products

Applicants also argue that Durlam fails to disclose the step of "etching the tunnel layer, the pinned magnetic layer and the metal layer using the insulation spacer and the hard mask as a mask to form a MTJ cell" as recited in claim 1 because Durlam uses only a hard mask layer 55. This argument is unpersuasive because as recited in col 4, lines 61-67 of Durlam, Durlam discloses etching layers 52, 45, 44, and 42 (notes Durlam is silent about the spacer 50 being etched) using hard mask layer 55 as a mask and using spacer 50 to position/cover the end of magnetic layer and top metal layer during the etching process. The above teaching of Durlam, as interpreted by the examiner, reads on the step of "etching the tunnel layer, the pinned magnetic layer and the metal layer using the insulation spacer and the hard mask as a mask" as required in claim 1.

7. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



LV

July 22, 2005